THE EFFECTS OF ALCOHOL, INSTRUCTIONS, AND SEX OF SUBJECT ON INTEGRATION OF SOCIAL AND NONSOCIAL LINGUISTIC IDEAS

BY

STEVEN JEFFREY SCHONHAUT

A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL
OF THE UNIVERSITY OF FLORIDA IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1984

ACKNOWLEDGEMENTS

I dedicate this project to my parents, Joshua and Mona Schonhaut, who encouraged me to pursue my dreams and supported my efforts to attain them. Completion of this project fulfills a great dream and represents a major personal milestone. I want to thank some special people who have helped in many ways to make this project possible. Special thanks are owed to Dr. Jalie Tucker, chairperson of my doctoral committee and my major advisor, for the faith she had in me and for the wisdom and support she offered to me. I would also like to thank the other members of my doctoral committee: Drs. Hugh Davis and Rudy Vuchinich for the guidance and support they have given me throughout my graduate school career, Dr. Richard Griggs for his invaluable assistance in designing the memory task used in this experiment, and Dr. Randy Carter for his help in analyzing the data from this study. I also wish to thank Dr. Raymond Knight for encouraging me to pursue my studies in psychology and for the inspiration his example provided for the present research, and my grandfather, Dr. Matthew Diamond, whose career as a clinical psychologist has served as a model for me to follow. Finally, I would like to give special thanks to Jan Sloan for the tremendous personal support she has provided throughout the time I was working on this project.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS ii

ABSTRACT v

CHAPTER ONE INTRODUCTION 1

Statement of the Problem 1
Summary of Research on the Effects of Alcohol Intoxication on Memory 2
The Cognitive Integration Paradigm 3
The Balanced Placebo Design 8
Rationale 9
Hypotheses Tested 11

CHAPTER TWO METHOD 13

Subjects 13
Stimulus Materials 13
Procedure 14
    Beverage Administration Procedure 15
    Acquisition Procedure 16
    Recognition Procedure 17
    Postexperimental Procedure 18

CHAPTER THREE RESULTS 20

Manipulation Checks 20
    Blood Alcohol Levels 20
    Beverage Consumption Estimates and Intoxication Ratings 20
    Acquisition 22
Recognition 22
    Analysis of NEW CASES 22
        Composite scores for NEWS 23
        Social Stimulus Type scores for NEWS 23
        Idea Set scores for NEWS 25
    Analysis of OLD versus NEW CASES 33
        Composite scores for OLDS versus NEWS 35
        Social Stimulus Type scores for OLDS versus NEWS 36
        Idea Set scores for OLDS versus NEWS 39
    Analysis of NONCASE Scores 48

Page

CHAPTER FIVE DISCUSSION 50

APPENDIX

A IDEA SETS 57
B NONCASE SENTENCES 60
C CONSENT FOR RESEARCH 61
D ACQUISITION STIMULI 63
E RECOGNITION ANSWER SHEET 65
F RECOGNITION SENTENCES 67
G POSTEXPERIMENTAL QUESTIONNAIRE 69
H DEBRIEFING STATEMENT 70
I SUMMARY OF PRETEST DATA 71
REFERENCE NOTES 73
REFERENCES 74
BIOGRAPHICAL SKETCH 77

Abstract of Dissertation Presented to the Graduate Council
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

THE EFFECTS OF ALCOHOL, INSTRUCTIONS, AND SEX OF SUBJECT ON THE INTEGRATION OF SOCIAL AND NONSOCIAL LINGUISTIC IDEAS

By

Steven Jeffrey Schonhaut

August, 1984

Chairman: Jalie A. Tucker, Ph.D.
Major Department: Clinical Psychology

This experiment investigated the effects of alcohol, instructions, and sex of subject on the cognitive integration of social and nonsocial linguistic ideas. In a 2 X 2 factorial design, 32 male and 32 female normal drinker subjects received either an alcoholic or a nonalcoholic beverage and were told that the beverage either did or did not contain alcohol. An incidental recognition task, using the procedure developed by J. D. Bransford and J. J. Franks in 1971, was then administered. Half of the sentences were derived from complex ideas that contained social references and half from complex ideas that did not contain social references. The main dependent measure was subjects' responses on the recognition test, including their confidence ratings for each sentence. The hypothesis that alcohol consumption would impair subjects' ability to integrate the interrelated parts of a complex idea was not supported; all treatment groups performed the integration task equally well. This result contrasts with previous alcohol research that has found memory deficits on many different tasks. A major difference noted between this experiment and prior research is that the present stimulus materials were presented within a semantically relevant context. Further research that investigates the effects of alcohol consumption on semantically meaningful information is recommended.

CHAPTER ONE
INTRODUCTION

Statement of the Problem

Alcohol consumption has been shown to cause wideranging memory (i.e., information processing) deficits that encompass all major levels of storage, including sensory, short-term, and long-term storage (Schonhaut, Note 1). It has been suggested recently that information processing deficits due to alcohol intoxication may be relevant to understanding the social behavioral effects of alcohol (e.g., Hull, 1981; Lansky & Wilson, 1981; Tucker & Vuchinich, 1983). The reasoning behind this suggestion is that if alcohol impairs people's ability to efficiently process social information, this should affect the responses they make in social situations. As stated by Tucker and Vuchinich (1983):

> Any pharmacological action of alcohol that may disrupt the effective processing of relevant social information may be hypothesized to affect, at least indirectly, the resulting social behavioral responses dependent on that information. (p. 215-216)

Most information processing research on alcohol, however, has used stimulus materials with minimal semantic and social meaning (e.g., digits, word lists, paired associates) and, therefore, has provided data with only limited relevance to the social behavioral effects of alcohol. The present research investigated the effects of alcohol on an information processing task that used semantically meaningful, socially relevant materials. The stimuli for the study consisted of sets of related sentences that were presented using the cognitive integration procedure developed by Bransford and Franks (1971). The present research evaluated the effects of a moderate alcohol dose on the ability of subjects to perform cognitive integration. Also, because recent research has indicated that both pharmacological and nonpharmacological factors associated with moderate alcohol consumption frequently affect postconsumption behaviors (see Marlatt & Rohsenow, 1980), a balanced placebo design (BPD) was employed in the study.

Summary of Research on the Effects of Alcohol Intoxication on Memory

Research has shown that alcohol consumption causes information processing deficits in sensory, short-term, and long-term storage (see Schonhaut, Note 1). The data further suggest that these alcohol-induced deficits may be greater when the processing demands of a task are greater. Relevant to this proposal is evidence indicating that alcohol-induced deficits may be more pronounced for encoding than for retrieval processes. Research has found memory deficits when encoding occurred during intoxication and retrieval occurred during sobriety (Goodwin, Powell, Bremer, Hoine, & Stern, 1969; Jones, 1973; Miller, Adesso, Fleming, Gino, & Lauerman, 1978; Parker, Birnbaum, & Noble, 1976; Peterson, 1977; Wickelgren, 1975), whereas deficits generally have not been found when encoding occurred during sobriety and retrieval occurred during intoxication (Birnbaum, Parker, Hartley, & Noble, 1978, Experiment 2; Goodwin et al., 1969; Jones, 1973; Miller et al., 1978, Experiment 2; Parker et al., 1976). Other evidence of alcohol-induced deficits in encoding is the presence of impairment on both recognition (Birnbaum, Johnson, Hartley, & Taylor, 1980; Goodwin et al., 1969; Lansky & Wilson, 1981; Parker et al., 1976; Wickelgren, 1975) and paired-associate (Birnbaum et al., 1978, Experiment 2;

Parker et al., 1976; Tarter, 1970) tasks; because retrieval operations are minimized by strong retrieval aids on these tasks, any observed impairment should be more a reflection of encoding deficits than of retrieval deficits. The apparently greater sensitivity of encoding operations to the detrimental effects of alcohol may occur because encoding processes often utilize more processing capacity than retrieval processes; i.e., encoding operations involve the bulk of processing activities performed on data prior to storage including complex computational and organizational activities, while retrieval operations involved in accessing previously stored information are generally simpler and require less central processing.

The efficient organization of inputted information is an important encoding operation. One way this operation has been investigated is by examining the amount of clustering on free recall tasks. Consistent with the evidence indicating that alcohol consumption causes encoding deficits are data showing a decrease in free recall clustering during intoxication (Birnbaum et al., 1978, Experiment 1; Parker, Alkana, Birnbaum, Hartley, & Noble, 1974; Rosen & Lee, 1976). Additional research investigation of deficits in organizational encoding following alcohol consumption may further elucidate the extent of alcohol-induced memory impairment and its relevance to alcohol's social behavioral effects.

The Cognitive Integration Paradigm

The procedure developed by Bransford and Franks (1971) has been used in research to assess the ability of subjects to encode a series of semantically related inputs (e.g., sentences) into an organized holistic unit. The basic procedure employs an incidental learning task that is divided into an acquisition phase and a recognition phase.

During the acquisition phase, subjects are typically presented with a series of 24 sentences derived from four complex idea sentences (called prototypes). Each of these prototypic sentences contains four simple ideas. For instance the prototypic sentence, "The rock which rolled down the mountain crushed the tiny hut at the edge of the woods," contains the four simple ideas (1) The rock rolled down the mountain; (2) The rock crushed the hut; (3) The hut was tiny; and (4) The hut was at the edge of the woods. During the acquisition phase, subjects are generally presented with sentences containing one (ONES), two (TWOS), or three (THREES) ideas from the prototypes (FOURS), but never with the entire prototypes.

Subjects are not told about the subsequent recognition test, but instead are led to believe that the study is investigating short-term memory for sentences. Following each acquisition sentence, subjects are engaged in a distractor task (e.g., color naming, digit counting) for about 5 seconds and then are asked an elliptical question about the preceding sentence (for example, elliptical questions for sentences that could be derived from the prototype above about the hut might be (1) What did? (answer is, "the rock"), (2) Did what? (answer is, "crushed the hut"), or (3) Where? (answer is, "at the edge of the woods").

After the acquisition phase, subjects are given a short rest break and then are informed that they will be presented a series of sentences that are closely related to the earlier sentences. Subjects are asked to indicate which sentences are identical to the ones presented during acquisition by responding YES or NO to each recognition phase sentence. Subjects are also asked to provide a rating from 1-5 of how confident they are in each answer. YES responses are then assigned positive scores and NO responses are assigned negative scores creating a scale ranging from -5 to +5 indicating how certain subjects were that they had heard each sentence before (certainty ratings). The recognition sentences generally contain some NEW and OLD instances that are consistent with the prototypes (i.e., CASES) and some sentences that are inconsistent with the prototypes (i.e., NONCASES). These NONCASE sentences either violate the relationship between the ideas in a single prototype or contain ideas from several prototypes. The four prototypes, none of which were presented during the acquisition phase, are among the NEWS included in the recognition set.

Bransford and Franks (1971) conducted three studies employing this basic procedure. Using auditorily presented sentences, they found that subjects recognized the prototypes as having been heard during acquisition even though they were not. Moreover, subjects were more certain that they had previously heard the prototypes than they were of hearing any of the OLD nonprototypic sentences that actually were presented during acquisition. The Bransford and Franks studies further showed that subjects generally recognized all CASE sentences as having been presented earlier, and that their certainty ratings for these CASE sentences followed a linear ordering with FOURS > THREES > TWOS > ONES. The NONCASE sentences were accurately rejected as having not been heard during acquisition. Subjects also showed little ability to distinguish between NEW and OLD CASES. Only for the ONES did subjects show any specific sentence memory, such that OLDS at that level were recognized with more certainty than NEWS at that level. Moreover, even the OLD ONES were recognized with less certainty than the NEW TWOS.

Bransford and Franks (1971) concluded from their data that subjects do not acquire a specific rote list of acquisition sentences. Instead, they appear to encode a set of integrated prototypes by combining information from semantically related sentences. This view can account for why subjects were able to recognize the prototypes as having been presented during acquisition, why the ratings for the CASE sentences increased in a positive linear relationship with the number of ideas contained in a sentence, and why OLDS and NEWS were recognized with about equal certainty.

The initial Bransford and Franks (1971) studies were conducted using concrete sentences (for instance, the sentence about the "tiny hut" cited earlier). Franks and Bransford (1972) have subsequently replicated this cognitive integration effect using abstract sentences (e.g., "The arrogant attitude in the speech led to immediate criticism."). Other researchers (e.g., Flagg & Reynolds, 1977; Knight & Sims-Knight, 1979) have also replicated the basic integration effect, though some minor discrepancies have been noted. For example, whereas Bransford and Franks (1971) and Franks and Bransford (1972) used auditorily presented sentences and found little evidence for specific sentence recognition (i.e., NEWS and OLDS were recognized about equally well), later studies used visual presentation of sentences and found greater evidence of specific sentence memory effects (Flagg & Reynolds, 1977; Knight & Sims-Knight, 1979). This discrepancy notwithstanding, these studies obtained the critical linear ordering effect suggesting that subjects also constructed an integrated prototype, in addition to remembering some specific sentence information.

The actual process responsible for the linear ordering effect found using the Bransford and Franks (1971) procedure has been a subject of some debate. Bransford and Franks explained the phenomenon as evidence of active integration of prototypes by subjects, and offered these data as support for a constructive model of memory. Other investigators (e.g., Anderson & Bower, 1973; Reitman & Bower, 1973), in keeping with an associationistic model of memory, have attempted to explain the effect using a "tally" model. According to this model, subjects tally the number of times two or more ideas appear in relationship to one another and then base their certainty ratings on this count. The theoretical debate between the prototype and tally hypotheses remains unresolved, although since the initial Bransford and Franks studies an increasing amount of research has been guided by the constructive model of memory (e.g., see Bransford, 1979). However, in either case, the linear ordering effect shown by subjects using the Bransford and Franks procedure is indicative of efficient organizational encoding.

The sensitivity of the Bransford and Franks' (1971) procedure to detecting deficits in organizational encoding has been demonstrated by Knight and Sims-Knight (1979) in a study that employed the Bransford and Franks procedure with schizophrenics. Like the relevant alcohol research (Birnbaum et al., 1978, Experiment 1; Parker et al., 1974; Rosen & Lee, 1976), studies using schizophrenics have shown organizational encoding deficits as manifested by reduced clustering on free recall tasks (Koh, Kayton, & Berry, 1974; Traupmann, 1975). In the Knight and Sims-Knight study, the Bransford and Franks procedure was administered to three subgroups of schizophrenics of varying psychopathology (good premorbid acutes, poor premorbid acutes, chronics) and to nonpsychiatric and nonschizophrenic psychiatric control groups. Significant deficits in cognitive integration were found for the more severe schizophrenics. Whereas subjects in both control groups and the good premorbid acute schizophrenics (best prognosis) showed the same linear ordering effect as did subjects in the Bransford and Franks (1971) study (i.e., Fours > THREES > TWOS > ONES), the poor premorbid acutes (medium prognosis) showed only partial integration (i.e., FOURS < THREES > TWOS > ONES) and the chronics (worst prognosis) showed no integration at all (i.e., the linear ordering effect was completely absent). Thus, schizophrenics, who initially showed organizational encoding deficits on a free recall task, further evinced organizational encoding deficits on the Bransford and Franks procedure.

The Balanced Placebo Design

Recent research on alcohol consumption has investigated the effects of both pharmacological and nonpharmacological factors on postconsumption behaviors using a procedure known as the balanced placebo design (BPD). This procedure employs a 2 X 2 factorial design whereby the actual beverage administered to subjects (given alcohol or given nonalcohol) is factorially combined with instructions given to subjects about the contents of their beverage (told alcohol or told nonalcohol). Significant instruction main effects, which presumably reflect subjects' expectations of the effects of alcohol, have been reported on many social behavioral measures, including aggression, anxiety, sexual arousal, and mirth (reviewed by Marlatt & Rohsenow, 1980).

A few studies relevant to memory have also employed a balanced placebo design (e.g., Lansky & Wilson, 1981; Conners & Maisto, 1980; Miller et al., 1978, Experiment 1; Tucker, Vuchinich, & Schonhaut, Note 2; Vuchinich & Sobell, 1978; Williams, Goldman, & Williams, 1981). These studies have generally found significant effects due to beverage administration, with given alcohol subjects showing relatively more impairment (Lansky & Wilson, 1981; Conners & Maisto, 1980; Miller et al., 1978, Experiment 1; Tucker, Vuchinich, & Schonhaut, Note 2; Vuchinich & Sobell, 1978). Significant effects due to beverage content instructions have also been reported (Lansky & Wilson, 1981; Tucker, Vuchinich, & Schonhaut, Note 2; Vuchinich & Sobell, 1978), but typically have involved complex interactions with beverage administration and are not readily interpretable. Nonetheless, these findings suggest that both pharmacological and nonpharmacological factors may influence the postconsumption behavior of subjects on a memory task, thus supporting the use of a BPD in the proposed research.

Rationale

The present research investigated the effects of alcohol consumption on organizational encoding using the Bransford and Franks (1971) procedure. Research has found substantial evidence indicating that alcohol intoxication causes wideranging memory deficits including specific impairment in encoding processes. Previous research, however, failed to use semantically and socially relevant stimuli. The current study, employing the Bransford and Franks procedure, used stimuli that were both semantically meaningful and socially relevant. This investigation, thus, may have greater ecological validity than previous research on the effects of alcohol consumption on memory.

To facilitate the study's naturalistic relevance, the sentences used were auditorily presented since most verbal communication in social situations is through the auditory mode. The incidental nature of the learning task in the Bransford and Franks procedure further adds to the study's ecological validity because memory for most information in social situations is acquired incidentally rather than by a conscious effort at memorization.

In a partial replication of the Bransford and Franks (1971) procedure, half of the sentences presented to subjects were selected from those used by Bransford and Franks (1971). These sentences were derived from the following two prototypes: (1) "The rock which rolled down the mountain crushed the tiny hut at the end of the woods." and (2) "The ants in the kitchen ate the sweet jelly which was on the table." The sentences employed by Bransford and Franks, however, did not contain social references relevant to situations where people might consume alcohol. Therefore, two new prototypic sentences modeled after those used by Bransford and Franks were also presented to subjects in this study: (1) "The tall musician danced with the blue-eyed woman who lived by the beach." and (2) The young nurse watched the carefree student who smoked a cigarette." All subjects thus received half social and half nonsocial sentences, with the type of sentence thereby being a within-subjects factor.

Since research has shown that nonpharmacological as well as pharmacological factors associated with alcohol consumption may affect memory, a balanced placebo design was used in this investigation. Using a 2 X 2 factorial design, subjects were randomly assigned to one of four treatment conditions: (1) given alcohol/told alcohol, (2) given nonalcohol/told alcohol, (3) given alcohol/told nonalcohol, and (4) given nonalcohol/told nonalcohol. Thus, beverage administration and beverage content instructions were between-subjects factors.

A third between-subjects factor was sex of subject. Past research has found that alcohol consumption may have a differential effect on the performance of males and females on memory tasks (Jones & Jones, 1976; Tucker, Vuchinich, & Schonhaut, Note 2). Thus, an equal number of males and females were randomly assigned to each of the four treatment conditions.

Hypotheses Tested

The major hypothesis of this study was that alcohol consumption would disrupt the ability of subjects to integrate a series of semantically related sentences into prototypic wholes. This disruption would be manifested by a decrease in the linear ordering of certainty ratings by subjects given alcohol. Given nonalcohol subjects were predicted to show full linear ordering of certainty scores (i.e., FOURS > THREES > TWOS > ONES). In contrast, given alcohol subjects were predicted to show either partial integrative ordering or no integrative ordering at all. Partial integrative ordering would be manifested in any pattern of certainty ratings that shows some linear increase in scores as the number of ideas in a sentence increases, but does not show the full integrative pattern (e.g., FOURS < THREES > TWOS > ONES; FOURS < THREES < TWOS > ONES; etc.). A complete absence of integration would be manifest in a random pattern of certainty scores, or scores that are unrelated to the number of ideas in a sentence. The exact pattern of certainty scores that would be shown by subjects given alcohol was not predicted, other than that full

---

integrative ordering would not be obtained. The greater the deviance this pattern had from full linear ordering, the greater would be the degree of alcohol-induced deficits.

No predictions were made about the effects of alcohol consumption on specific sentence memory. Past research has found deficits due to alcohol consumption on a sentence memory task, but no semantic interrelationships existed among the sentences used (Birnbaum, et al., 1980). The Bransford and Franks (1971) task, in contrast, is not especially sensitive to specific sentence memory effects, as illustrated by the failure of Knight and Sims-Knight (1979) to find any deficits in specific sentence memory even for those subjects who showed deficits in integrative memory. Nevertheless, for given nonalcohol subjects, past research (Bransford & Franks, 1971; Franks & Bransford, 1972) suggests that they would evince specific sentence memory for the ONES and possibly for the TWOS.

No a priori basis existed to predict that the effects of alcohol consumption would differ for the social and nonsocial sentences, so this variable was considered exploratory. Moreover, no specific predictions could be advanced regarding the effects of sex of subject and beverage content instructions on the degree of integrative ordering shown by subjects. Although past alcohol research suggested that these variables might have significant effects, it was not clear what they might be. Previous research on the sex variable, for instance, has been inconsistent, with Jones and Jones (1976) finding following alcohol consumption superior performance by males than by females, and Tucker, Vuchinich, and Schonhaut (Note 2) finding the reverse. As for the instructional variable, previous research on memory has produced occasional significant effects in interaction with beverage effects that have been difficult to interpret, thus precluding specific predictions.

CHAPTER TWO
METHOD

Subjects

Subjects were 32 male and 32 female undergraduates, ages 19 to 25 years, who were enrolled in introductory psychology classes at the University of Florida (n=8 males and 8 females per cell). The subjects received course credit for their participation in a single 2-hour experimental session. The data from 9 additional subjects were excluded due to refusal to finish the beverage (2), failure of the instructional manipulation (3), and contamination of the data due to inter-subject communication during the experimental procedure (4).

Prior to their participation, all subjects were asked to complete the Drinking Practices Questionnaire (Cahalan, Cisin, & Grossley, 1969) and a brief form of the Michigan Alcoholism Screening Test (SMAST; Pokorny, Miller, & Kaplan, 1972). As assessed by the Drinking Practices Questionnaire, each of the four treatment conditions contained 6 or 7 heavy drinker and 1 or 2 moderate or light drinker male subjects and 3 to 5 heavy drinker and 3 to 5 moderate or light drinker female subjects. No subject scored within the problem drinking range (i.e., 4 or greater on a scale from 1-10) on the SMAST. Subjects were asked to refrain from using alcohol or other drugs on the day of their session and to avoid eating for two hours or drinking any liquid for 30 minutes prior to their session.

Stimulus Materials

Consistent with the Bransford and Franks (1971) experimental procedures stimulus materials consisted of four complex sentences (prototypes) containing 4 distinct ideas (FOURS), and an associated set of simpler sentences consisting on one (ONES), two (TWOS), or three (THREES) of the four propositions contained in the respective complex sentences. Each of the simpler sentences maintained the semantic relationships contained in the complex sentence from which it was derived. The four proposed idea sets (CASES) each consisted of 4 ONES, 4 TWOS, 3 THREES, and 1 FOUR. Two of the prototypes were used by Bransford and Franks (1971) and contained no social references (nonsocial), while the other two prototypes contained social references that are relevant to the types of situations where alcohol might be consumed (social). Appendix A presents the four prototypes used and the associated idea sets.

An additional four sentences that were not members of the four idea sets (NONCASES) were also constructed. Each of these NONCASE sentences contained four propositions from the idea sets, but did not maintain the appropriate semantic relationships. Two of the NONCASES contained propositions taken from more than one complex sentence, while the other two consisted of the four ideas from one complex sentence reassembled in a manner that changed the meaning of the original complex sentence. Appendix B presents the four NONCASE sentences.

A pretest study was conducted to verify that the linear ordering effect found by Bransford and Franks (1971) was found for the proposed stimulus materials using sober subjects. The pretest results, which are presented in Appendix I, verified the experimental appropriateness of the present four stimulus materials.

Procedure

Sessions were conducted in the afternoon or early evening. Subjects participated either individually (36) or in pairs (28); subjects who participated in pairs were fully separated by partitions. Subjects were told that the purpose of the experiment was to investigate the effects of alcohol consumption on short-term memory. Subjects were informed that they would receive either an alcoholic or a nonalcoholic control beverage and then would be administered a short-term memory task. Subjects were told that they would hear a number of sentences, each of which would be followed by an arithmetic distractor task and then by a question about the preceding sentence. Next, subjects read and signed a statement of informed consent (see Appendix C). They were then weighed and escorted to a second room where the main experimental procedures were conducted.

Beverage Administration Procedure

Beverages were administered using a balanced placebo design procedure as described by Marlatt, Demming, and Reid (1973). Subjects were told that they would be randomly assigned to receive either an alcoholic or a nonalcoholic beverage by drawing a slip of paper from a cup. The actual random assignment of each subject was determined by the experimenter who prepared the cup to contain either all "alcohol" or all "nonalcohol" slips, depending on the subjects' actual beverage content instruction condition.

The experimenter then mixed the beverages in full view of the subjects. In accordance with the subject's instructed condition, the experimenter either poured 1/6 of the beverage from a vodka bottle and 5/6 from a tonic bottle or the entire beverage from a tonic bottle. Depending on the subject's actual beverage condition each bottle either contained a 1:5 mixture of vodka and tonic or tonic only. Prior research (Marlatt et al., 1973) indicated that the alcoholic content of this mixture cannot be reliably identified beyond chance levels.

The beverages were divided equally into three cups and a capful of Rose'e lime juice was added to each portion to further disguise the contents of the beverage and to make it more palatable. Subjects were asked to consume the drinks in three consecutive 10-minute intervals. This was followed by a 15-minute beverage absorption period during which subjects were also given (false) BAL feedback that was consistent with their instructed condition. Subjects in the told alcohol and told nonalcohol conditions received BAL readings of about .05% (mg ethanol/100 ml blood) and .00%, respectively. In the given alcohol condition, males received .80 grams of absolute alcohol per kilogram of body weight (gm/kg), and females received .75 gm/kg; slightly higher doses were used for the males because of evidence suggesting that females get somewhat more intoxicated than males with the same alcohol dose (e.g., Jones & Jones, 1976). Both alcohol doses were expected to produce a peak BAL of about .07% 20-40 minutes after consumption.

Acquisition Procedure

Subjects were told that they would be asked to answer some questions about sentences that they would hear. The sequence of the acquisition procedure, which was presented entirely on a taperecorder, was as follows: (1) subjects heard a sentence; (2) subjects were given a number from which they were to begin counting backwards by 3s; (3) after 5 seconds a tone sounded on the tape that signaled the subjects to stop counting; (4) the subjects heard an elliptical question (e.g., for the sentence, "The rock crushed the tiny hut at the edge of the woods." the elliptical question was, "What did?") concerning one element of the preceding sentence; (5) subjects were given 10 seconds to write down their answer to the question before the next sentence was presented.

Two practice trials were conducted with sentences that were similar to those used in the experimental procedure. The acquisition list comprised of 24 sentences from the four idea sets was then presented. This list contained 2 ONES, 2 TWOS, and 2 THREES from each idea set. Each of the four propositions in each idea set appeared approximately an equal number of times in the acquisition list. Also, the elliptical questions asked about each of the elements of each prototype appeared about the same number of times. The acquisition sentences and elliptical questions are presented in Appendix D.

The 24 acquisition sentences were ordered so that each of six consecutive blocks of 4 sentences within each block was determined randomly except that two sentences from the same idea set were never presented consecutively. Two acquisition orders were used in presenting the list (Order 1, 1-24; and Order 2, 24-1) with an equal number of subjects in each experimental condition receiving each order.

Recognition Procedure

Following the acquisition procedure, subjects were given a 6-minute rest break. Subjects were told that the break was provided to give them a chance to use the restroom so that they would remain alert. They were further instructed that they would be given another short-term memory task following the break. After the break, subjects were told that they would hear a second set of sentences that were closely related to the sentences they had just heard. They were asked to indicate which sentences in the new set they had actually heard before and which ones they had not heard by circling YES or NO on a sheet or paper (see Appendix E). Subjects were also asked to rate on a 1 to 5 scale how confident they were of their answers (1= "very low confidence" and 5= "very high confidence"). The recognition sentences were presented on a taperecorder with subjects being given 10 seconds between sentences to write down their answers.

A 40 sentence recognition list (similar to the one used by Franks and Bransford, 1972) containing 24 NEWS, 12 OLDS, and 4 NONCASES was presented (see Appendix F). The 24 NEW sentences contained 2 ONES, 2 TWOS, 1 THREE, and 1 FOUR from each idea set. The 12 OLDS included 1 ONE, 1 TWO, and 1 THREE from each idea set.

The order of the recognition sentences was arranged so that four consecutive blocks of 10 sentences each contained 6 NEWS, 3 OLDS, and 1 NONCASE. The 6 NEWS included at least 1 sentence from each idea set and no more than 2 sentences from the same idea set. The 3 OLDS were selected from 3 different idea sets with 2 of them being from the idea sets for which there was only 1 NEW sentence in the block. The sentences in the blocks were randomly ordered with the restriction that sentences from the same idea set were not presented consecutively.

Each subject was given the recognition list twice with no break between the two presentations. The purpose of using two recognition trials was to counterbalance for order effects, with the mean score of the two trials then being used in the data analyses. The order of presentation for subjects who received acquisition Order 1 was 1-20, 21-40; 20-1, 40-21; for those subjects who received acquisition Order 2, the recognition order was 40-21, 20-1; 21-40, 1-20.

Postexperimental Procedure

Subjects next were asked to complete a questionnaire designed to test the effectiveness of the beverage content instruction manipulations

---

(see Appendix G). Subjects were asked to indicate (1) whether they had consumed an alcoholic or a nonalcoholic beverage, (2) how much alcohol they had received in ounces, and (3) how intoxicated they felt on a 0-10 scale (0= "not at all intoxicated" and 10= "very intoxicated"). Subjects were then administered a breath test to determine their actual BALs approximately 100 minutes after the start of the drinking interval. They were then debriefed (see Appendix H for the debriefing statement signed by subjects) and either dismissed or escorted home depending upon their BAL.

CHAPTER THREE
RESULTS

Analyses of variance were used for the major data analyses. Unless otherwise indicated, when significant interactions were found, post hoc analyses were conducted as follows: for significant 3-way interactions, separate 2-way ANOVAs involving two of the treatment variables were conducted at each level of the third independent variable. Significant 2-way interactions, including those found in the post hoc analyses of the 3-way interactions, were generally analyzed by conducting one-way ANOVAs on one of the treatment variables at each level of the second variable; in a few instances, when conceptually relevant, pairwise comparisons were made instead among all means involved in the 2-way interaction. Pairwise comparisons were also employed in the post hoc analyses of significant one-way ANOVAs, and were conducted using Duncan's multiple range test with a significance level of $\alpha = .05$ for the set of comparisons.

Manipulation Checks

Blood Alcohol Levels

A 2 X 2 (Instruction X Sex of Subject) analysis of variance of given alcohol subjects' BALs at the end of the experimental session showed no significant differences (grand $\underline{M} = .054\%$; $\underline{SD} = 0.17$).

Beverage Consumption Estimates and Intoxication Ratings

A 2 X 2 X 2 (Beverage X Instructions X Sex of Subject) analysis of variance was conducted on subjects' postexperimental estimates of alcohol consumption and on their postexperimental intoxication ratings. The analysis of beverage consumption estimates showed a significant main effect for instructions, *F*(1,56) = 50.08, *p* < .0001; told alcohol subjects estimated that they had consumed significantly more alcohol (*M* = 3.34 oz. [98.76 ml]; *SD* = 1.45) than did told nonalcohol subjects (*M* = .75 [22.18 ml]; *SD* = 1.61). A significant Beverage X Instructions interaction was also obtained, *F*(1,56) = 4.54, *p* < .038. The means for the TA/GA, TA/GN, TN/GA, and TN/GN conditions were 3.31 oz. ([97.89 ml]; *SD* = 1.20), 3.38 oz. ([99.96 ml]; *SD* = 1.71), 1.50 oz. ([44.36 ml]; *SD* = 2.03), and 0.0 oz. ([0.0 ml]; *SD* = 0.0), respectively. Because the latter treatment condition had zero variance, it was not possible to fully examine the 4 interaction means with pairwise conparisons. Instead, a *t*-test (2-tailed), with α = .05, between the two told alcohol conditions yielded no significant differences. These results suggest that the 4 interaction means generally followed the instruction main effect except for the increased consumption estimates observed in the TN/GA condition. Moreover, a second *t*-test (2-tailed) comparison revealed that the mean of the TN/GA conditions was significantly less than the pooled mean of the two given alcohol conditions, *t*(46) = 3.24, *p* < .0007.

Analysis of subjects' intoxication ratings revealed significant instruction, *F*(1,56) = 14.73, *p* < .0003, and beverage, *F*(1,56) = 54.46, *p* < .0001 main effects. Told alcohol subjects (*M* = 3.45; *SD* = 2.64) and given alcohol subjects (*M* = 4.30; *SD* = 2.64) made significantly higher ratings than did told nonalcohol subjects (*M* = 1.63; *SD* = 2.52) and given nonalcohol subjects (*M* = .78; *SD* = 1.31), respectively. No other treatment effects were significant. Overall, the beverage main effect found for the intoxication ratings and the Beverage X Instruction interaction obtained for the consumption estimates suggest that the beverage content instructions may not have been fully effective, primarily in the TN/GA condition.

Acquisition

A 2 X 2 X 2 (Beverage X Instruction X Sex of Subject) analysis of variance on the number of acquisition questions that subjects correctly answered revealed no significant differences (grand $\underline{M}$ = 22.77; SD = 1.67). This suggests that any differences found between the treatment conditions in their subsequent recognition performance are not attributable to differences in processing of the individual sentences during acquisition.

Recognition

An 11-point rating scale (ranging from +5 to -5) of how certain subjects were that they had previously heard each recognition sentence was derived from their recognition responses. Ratings for YES responses were assigned a positive value, and ratings for NO responses were assigned a negative value. The ratings for the two trials of each sentence were summed together and the mean certainty ratings for the two trials were used in all data analyses.

Analysis of NEW CASES

Three separate analyses of variance were conducted on subjects' recognition scores for the NEW CASES (NEWS). All of the analyses involved at least three between-subjects factors (beverage, instructions, sex of subject) and one within-subjects factor (LEVEL). The LEVEL factor represented the number of ideas in each recognition sentence (i.e., ONE, TWO, THREE, or FOUR). The first analysis was conducted on the composite scores for all NEWS, i.e., on the combined data from all four idea sets. In the second analysis, data from the two nonsocial idea sets (sets A and B) was combined into one composite score, and data from the two social idea sets (sets C and D) into another composite score; social stimulus type (i.e., nonsocial or social), thus was used as a second within-subjects factor in this analysis. Finally, the third analysis treated the data from each of the four idea sets separately, and idea set (i.e., A, B, C, or D) was used as a second within-subjects factor in this analysis.

Composite scores for NEWS. A 2 X 2 X 2 X 4 (Beverage X Instruction X Sex of Subject X LEVEL) analysis of variance revealed a significant main effect for LEVEL, $F(3, 168) = 221.77$, $p < .0001$. As presented in Table 1 and Figure 1 there was full integrative ordering of the means (i.e., FOURS > THREES > TWOS > ONES), and pairwise comparisons showed that the differences among all the means were significant. No significant main or interactive effects involving any of the between-subjects factors were obtained.

Social Stimulus Type scores for NEWS. A 2 X 2 X 2 X 4 X 2 (Beverage X Instruction X Sex of Subject X LEVEL X Social Stimulus Type) analysis of variance showed a significant LEVEL Main effect, $F(3, 168) = 222.50$, $p < .0001$, which is redundant with the LEVEL effect found for the composite score analysis and, therefore, is not discussed further. A significant LEVEL X Social Stimulus Type interaction, $F(3, 168) = 12.07$, $p < .0001$, was also obtained. Separate one-way analyses of variance conducted on each of the 2 levels of the Social Stimulus Type factor showed significant LEVEL simple main effects for both the nonsocial, $F(3, 189) = 99.15$, $p < .0001$, and social, $F(3, 189) = 188.56$, $p < .0001$, idea sets. Pairwise comparisons suggested that the integration effect may have been somewhat more

Table 1. Mean Certainty Ratings for NEWS

	LEVEL			
	FOURS	THREES	TWOS	ONES
M	3.23	2.39	.31	-2.14
SD	1.44	1.30	1.60	1.82
Group[a]	A	B	C	D

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

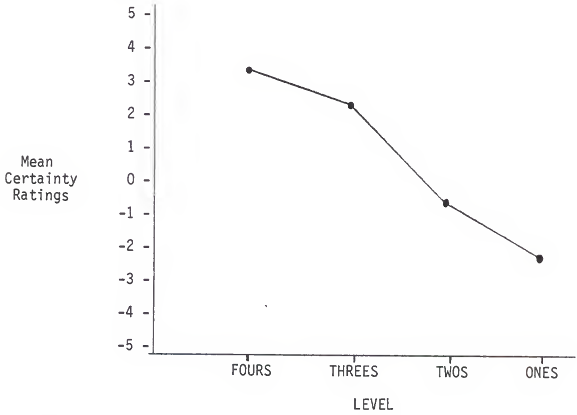

Figure 1. Mean certainty ratings for NEWS

pronounced for the social than for the nonsocial sets; full integrative ordering was found for both the social and the nonsocial sets, but only for the social sets were the differences significant among all levels of LEVEL. For the nonsocial sets the difference between the FOURS and the THREES was not significant (all other pairwise comparisons were significant). The LEVEL means for the social and the nonsocial idea sets are shown in Table 2 and in Figure 2.

Idea Set scores for NEWS. A 2 X 2 X 2 X 4 X 4 (Beverage X Instruction X Sex of Subject X LEVEL X Idea Set) analysis of variance revealed a significant main effect for LEVEL, $F(3, 168) = 225.39$, $p < .0001$, which is redundant with the composite score analysis and, therefore, is not discussed further. Also obtained were a significant main effect for idea set, $F(3, 168) = 6.31$, $p < .0005$, a significant Sex of Subject X LEVEL X Idea Set interaction, $F(9, 279) = 5.49$, $p < .0001$, and a significant LEVEL X Idea Set interaction, $F(9, 504) = 14.20$, $p < .0001$, interaction.

Pairwise comparisons showed that the idea set main effect was due to the mean certainty ratings for Idea Set D ($M = .41$; $SD = 3.47$) being significantly lower (at the $p < .05$ level) than for Idea Sets B ($M = 1.28$; $SD = 3.19$), C ($M = 1.22$, $SD = 3.39$), and A ($M = .95$; $SD = 3.04$); the means for the latter three idea sets did not differ significantly from each other.

Post hoc analyses of the Sex of Subject X LEVEL X Idea Set interaction were performed separately for male and female subjects to examine what differences, if any, there might be in the integration (i.e., LEVEL effects) of the different idea sets by male and female subjects. These analyses showed significant LEVEL X Idea Set interactions for both males, $F(9, 279) = 5.49$, $p < .0001$, and females,

Table 2. Mean Certainty Ratings by Social Stimulus Type for NEWS

Social Stimulus Type	LEVEL FOURS	THREES	TWOS	ONES
Nonsocial				
M	2.82	2.39	.87	-1.71
SD	2.04	1.69	1.64	2.13
Group[a]	A	A	B	C
Social				
M	3.65	2.38	.26	-2.57
SD	1.65	2.03	1.98	1.93
Group[a]	A	B	C	D

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

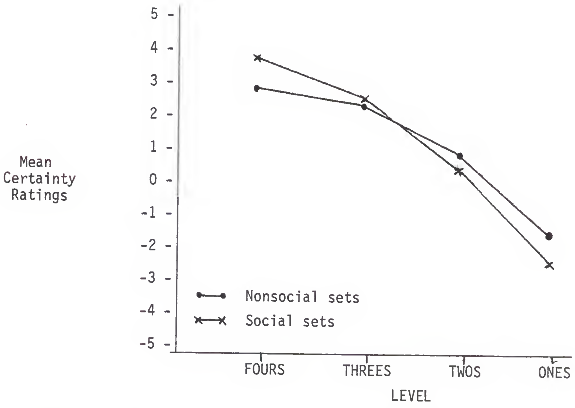

Figure 2. Mean certainty ratings by social stimulus type for NEWS.

$\underline{F}(9, 279) = 12.66$, $\underline{p} < .0001$. Separate one-way analyses of variance performed on each of the 4 levels of the idea set factor for males, females, and the combined data for both sexes indicated significant LEVEL simple main effects for all idea sets for male and female subjects separately and also for the combined data for both sexes (see Table 3).

For the males and for the combined data for both sexes, pairwise comparisons showed significant differences among all LEVEL means at the $\underline{p} < .05$ level for Idea Set D, among all LEVEL means except between FOURS and THREES for Idea Sets B and C, and between ONES and each of the other three LEVEL means for Idea Set A. For females, there were significant differences among all LEVEL means except between FOURS and THREES for Idea Sets B and C, and significant differences among all LEVEL means except between THREES and TWOS for Idea Sets A and D (see Tables 4, 5, 6 and Figures 3, 4, 5).

Analysis of OLD versus NEW CASES

Three separate analyses of variance were conducted to compare subjects' NEW and OLD CASE (NEWS + OLDS) scores. All of the analyses involved at least three between-subjects factors (beverage, instruction, and sex of subject) and two within-subjects factors (LEVEL, Case Type). For the LEVEL factor only ONES, TWOS, and THREES were included in these analyses because there were no OLD FOURS. The two levels of the Case Type factor were OLDS and NEWS. The first analysis was conducted on the composite scores for all four idea sets. In the second analysis, social stimulus type was introduced as a third within-subjects factor. Finally, in the third analysis, idea set (A, B, C, D) was included as a third within-subjects factor.

Table 3. Simple LEVEL Main Effects Within the Idea Sets

Group	d.f.	F	p
Males			
Idea Set A	3,93	22.47	<.0001
Idea Set B	3,93	55.63	<.0001
Idea Set C	3,93	47.59	<.0001
Idea Set D	3,93	65.94	<.0001
Females			
Idea Set A	3,93	9.71	<.0001
Idea Set B	3,93	52.44	<.0001
Idea Set C	3,93	80.04	<.0001
Idea Set D	3,93	48.81	<.0001
Males and Females			
Idea Set A	3,189	27.28	<.0001
Idea Set B	3,189	108.79	<.0001
Idea Set C	3,189	122.79	<.0001
Idea Set D	3,189	102.02	<.0001

Table 4. Males Mean Certainty Ratings by Idea Sets for NEWS

	LEVEL			
	FOURS	THREES	TWOS	ONES
Idea Set A				
M	1.91	2.08	1.66	-1.63
SD	3.06	2.54	1.92	2.33
Group[a]	A	A	A	B
Idea Set B				
M	3.67	3.23	.11	-2.30
SD	2.14	2.18	2.32	1.99
Group[a]	A	A	B	C
Idea Set C				
M	3.22	3.19	.26	-2.35
SD	2.30	2.44	2.25	2.51
Group[a]	A	A	B	C
Idea Set D				
M	4.00	2.20	-.52	-3.08
SD	1.70	2.77	2.55	2.44
Group[a]	A	B	C	D

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Table 5. Females Mean Certainty Ratings by Idea Set for NEWS

	LEVEL			
Idea Set	FOURS	THREES	TWOS	ONES
Idea Set A				
M	2.39	.98	1.00	-.82
SD	3.25	3.22	2.42	3.06
Group[a]	A	B	B	C
Idea Set B				
M	3.59	3.26	.78	-2.11
SD	2.20	2.27	1.72	2.40
Group[a]	A	A	B	C
Idea Set C				
M	3.56	4.28	.11	-2.50
SD	2.54	1.15	2.58	2.06
Group[a]	A	A	B	C
Idea Set D				
M	3.83	-.06	-.71	-2.35
SD	2.19	3.06	2.28	2.27
Group[a]	A	B	B	C

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Table 6. Combined (Males & Females) Mean Certainty Ratings by Idea Set for NEWS

Idea Set	LEVEL			
	FOURS	THREES	TWOS	ONES
Idea Set A				
M	2.15	1.53	1.33	-1.22
SD	3.14	2.93	2.19	2.73
Group[a]	A	A	A	B
Idea Set B				
M	3.63	3.25	.44	-2.20
SD	2.16	2.21	2.05	2.19
Group[a]	A	A	B	C
Idea Set C				
M	3.39	3.73	.18	-2.43
SD	2.41	1.97	2.40	2.28
Group[a]	A	A	B	C
Idea Set D				
M	3.91	1.07	-.62	-2.71
SD	1.95	3.12	2.40	2.37
Group[a]	A	B	C	D

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

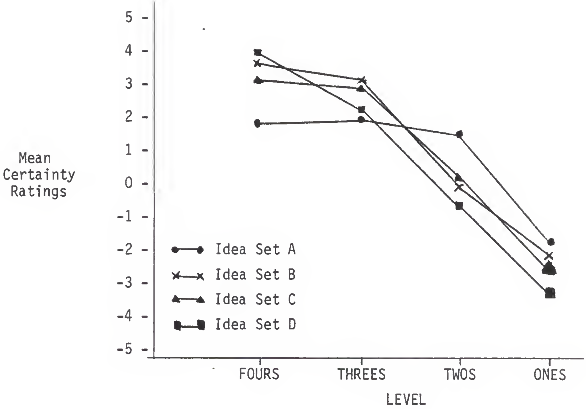

Figure 3. Males mean certainty ratings by idea sets for NEWS

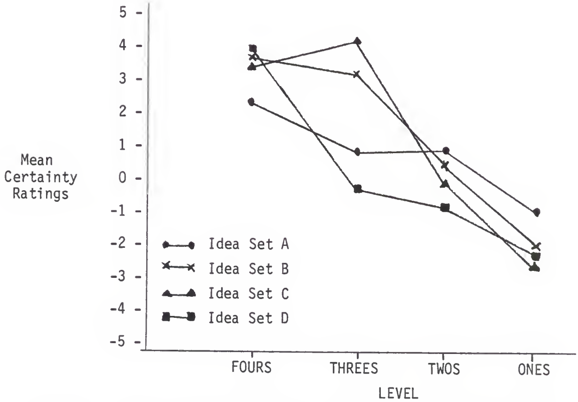

Figure 4. Females mean certainty ratings by idea sets for NEWS

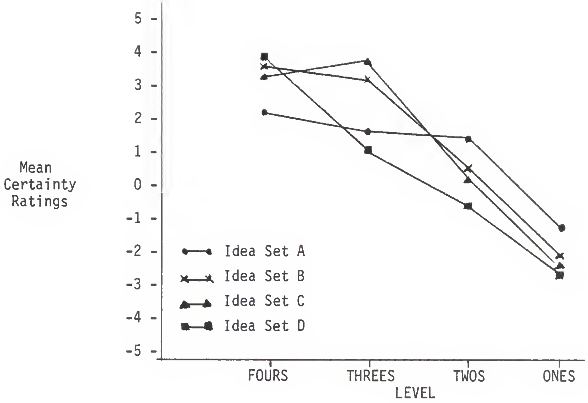

Figure 5. Combined (males & females) mean certainty ratings by idea sets for NEWS

Composite scores for OLDS versus NEWS. A 2 X 2 X 2 X 2 X 3 (Beverage X Instruction X Sex of Subject X Case Type X LEVEL) analysis of variance revealed significant main effects for LEVEL and case type, and significant Case Type X LEVEL and Beverage X Sex interactions. Table 7 presents the significant effects found for this overall analysis.

Table 7. Significant Effects Found with Beverage X Instruction X Sex of Subject X Case Type Analysis of Variance

Effect	d.f.	F	p
LEVEL	2,112	224.55	<.0001
Case Type	1,56	46.37	<.0001
Case Type X LEVEL	1,112	15.72	<.0001
Beverage X Sex	1,56	4.98	<.03

As shown in Table 8, pairwise comparisons revealed that the LEVEL main effect was due to significant differences at the $p < .05$ level among all LEVEL means with THREES > TWOS > ONES. The significant case type main effect was due to a significantly higher mean certainty rating for the OLDS ($M = 1.18$; $SD = 2.21$) than for the NEWS ($M = .19$; $SD = 2.44$).

Table 8. Mean Certainty Ratings for OLDS and NEWS Combined

	LEVEL		
	THREES	TWOS	ONES
M	2.56	.65	-1.17
SD	1.49	1.76	2.17
Group[a]	A	B	C

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Post hoc analyses of the significant Case Type X LEVEL interaction revealed that the subjects' ability to recognize OLDS with greater certainty than NEWS was dependent upon LEVEL; separate comparisons between OLDS and NEWS for each level of LEVEL showed that the OLDS were rated significantly higher than the NEWS for the ONES, $F(1,63) = 71.11$, $p < .0001$, and for the TWOS, $F(1,63) = 9.16$, $p < .004$, but not for the THREES, $F(1,63) = 2.11$, $p = .15$. Table 9 presents the means involved in the analyses. A one-way analysis of variance on the mean difference scores between OLDS and NEWS (difference score = OLDS - NEWS) for each level of LEVEL was conducted to test whether the differences between OLDS and NEWS varied significantly as a function of LEVEL. Results showed a significant LEVEL effect, $F(2,126) = 15.62$, $p < .0001$

and pairwise comparisons found that the mean difference score for the ONES ($\underline{d}$ = 1.94; $\underline{SD}$ = 1.84) was significantly greater (at the $\underline{p} < .05$ level) than for the TWOS ($\underline{d}$ = .68; $\underline{SD}$ = 1.84) or the THREES ($\underline{d}$ = .34; $\underline{SD}$ = 1.87); the means for the latter two groups were not significantly different. Taken together, these two analyses suggest that subjects were more certain that they had heard the OLDS than the NEWS for the ONES and the TWOS (but not for the THREES), and that the degree to which the OLDS were rated higher than the NEWS was greater for the ONES than for the TWOS.

Table 9. Mean Certainty Ratings for OLDS and NEWS by LEVEL

LEVEL	OLDS	NEWS
ONES		
$\underline{M}$	-.20	-2.14
$\underline{SD}$	2.06	1.82
Group[a]	A	B
TWOS		
$\underline{M}$	.99	.31
$\underline{SD}$	1.87	1.60
Group[a]	A	B
THREES		
$\underline{M}$	2.73	2.39
$\underline{SD}$	1.65	1.30
Group[a]	A	A

[a] Groups with different letters were significantly different than each other at the $\underline{p} < .05$ level.

Pairwise comparisons among all Beverage X Sex of Subject interaction means revealed that the interaction was due to a lower mean certainty rating for the given nonalcohol males ($\underline{M}$ = .19; SD = 2.47) than for the given alcohol males ($\underline{M}$ = 1.07; $\underline{SD}$ = 2.31) or the given nonalcohol females ($\underline{M}$ = .98; $\underline{SD}$ = 2.11), all $\underline{p}$s < .05. The means for the latter two groups were not significantly different, however, and the mean for the given alcohol females ($\underline{M}$ = .49; $\underline{SD}$ = 2.53) was not significantly different from that of any of the other groups.

Social Stimulus Type scores for OLDS versus NEWS. A 2 X 2 X 2 X 2 X 3 X 2 (Beverage X Instruction X Sex of Subject X Case Type X LEVEL X Social Stimulus Type) analysis of variance indicated, in addition to the significant effects reported earlier for the composite score analysis, significant Case Type X LEVEL X Social Stimulus Type, Case Type X Social Stimulus Type, and Beverage X Case Type X Social Stimulus Type interactions. Table 10 presents the significant effects found with this analysis.

Post hoc analyses of the significant Case Type X LEVEL x Social Stimulus Type interaction were performed separately for the nonsocial and the social idea sets and showed that the Case Type X LEVEL interactions were significant for both the nonsocial, $\underline{F}(2, 126) = 5.77$, $\underline{p} < .004$, and the social, $\underline{F}(2, 126) = 14.27$, $\underline{p} < .0001$, idea sets. Separate comparisons between OLDS and NEWS at each level of LEVEL showed that for the nonsocial sets, the OLDS were rated significantly higher than the NEWS for the ONES, $\underline{F}(1,63) = 15.24$, $\underline{p} < .0001$, but not for the TWOS, $\underline{F}(1,63) = .37$, $\underline{p} = .55$, or the THREES, $\underline{F}(1,63) = 3.50$, $\underline{p} = .07$. Similar comparisons for the social sets showed that the OLDS were rated significantly higher than the NEWS for the ONES, $\underline{F}(1,63) = 62.55$, $\underline{p} < .0001$, and the TWOS, $\underline{F}(1,63) = 21.26$, $\underline{p} < .0001$, but not for

Table 10. Significant Effects Found with the Beverage X Instruction X Sex of Subject X Case Type X LEVEL X Social Stimulus Type Analysis of Variance

Effect	d.f.	F	p
LEVEL	2,112	223.78	<.0001
Case Type	1,56	47.70	<.0001
Case Type X Social Stimulus Type	1,56	9.10	<.004
Case Type X LEVEL X Social Stimulus Type	2,112	6.11	<.003
Beverage X Case Type X Social Stimulus Type	1,56	4.39	<.041
Case Type X LEVEL	2,112	15.20	<.0001
Beverage X Sex	1,56	5.02	<.03

the THREES, $F(1,63) = .14$, $p = .71$ (see Table 11 for the interaction means). It was also found that the overall mean difference between OLDS and NEWS was significantly greater, $F(1, 319) = 8.82$, $p < .004$, for the social ($d = 1.41$; $SD = 2.85$) than for the nonsocial ($d = .59$; $SD = 2.64$) idea sets. However, as presented in Table 11, OLDS were rated significantly higher than the NEWS for both the social, $F((1, 319) = 29.39$, $p < .0001$, and the nonsocial, $F(1,319) = 5.19$, $p < .024$, idea sets.

Post hoc analyses of variance on the Beverage X Case Type X Social Stimulus Type interaction at each level of the social stimulus type variable showed that the Beverage X Case Type interactions were not significant for either the nonsocial, $F(1, 318) = .69$, $p = .41$, or the social, $F(1, 318) = 1.89$, $p = .17$, idea sets. Similar analyses at each level of the beverage administration variable revealed that the Case

Table 11. Mean Certainty Ratings for OLDS and NEWS by LEVEL and Social Stimulus Type

	Social		Nonsocial	
LEVEL	OLDS	NEWS	OLDS	NEWS
ONES				
M	-.02	-2.57	-.38	-1.71
SD	2.59	1.93	2.62	2.13
Group[a]	A	B	A	B
TWOS				
M	1.29	-.26	.69	.87
SD	2.52	1.99	2.47	1.64
Group[a]	A	B	A	A
THREES				
M	2.51	2.38	3.00	2.39
SD	2.31	2.03	2.07	1.69
Group[a]	A	A	A	A
All Levels Combined				
M	1.26	-.15	1.10	.52
SD	2.67	2.83	2.77	2.49
Group[a]	A	B	A	B

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Type X Social Stimulus Type interaction was not significant for subjects who received an alcoholic beverage, $F(1, 318) = .22$, $p = .64$, but was significant for subjects who received a nonalcoholic beverage, $F(1, 318) = 7.12$, $p < .009$. As presented in Table 12, given nonalcohol subjects rated the OLDS significantly higher than the NEWS for the social sets, $F(1, 159) = 22.20$, $p < .0001$, but not for the nonsocial sets, $F(1, 159) = 1.11$, $p = .29$.

Table 12. Mean Certainty Ratings of OLDS and NEWS by Social Stimulus Type for Subjects Given Nonalcohol

	Social		Nonsocial	
	OLDS	NEWS	OLDS	NEWS
M	1.46	-.30	.78	.41
SD	2.73	2.84	2.66	2.37
Group[a]	A	B	A	A

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Idea Set scores for OLDS versus NEWS. A 2 X 2 X 2 X 2 X 3 X 4 (Beverage X Instruction X Sex of Subject X Case Type X LEVEL X Idea Set) analysis of variance revealed, in addition to the significant effects reported for the composite scores, a significant idea set main effect and significant Case Type X Idea Set, LEVEL X Idea Set, Case Type X LEVEL X Idea Set, Beverage X LEVEL X Idea Set, and Sex of Subject X LEVEL X Idea Set interactions. Table 13 presents the significant effects found with this analysis.

Table 13. Significant Effects Found with the Beverage X Instruction X Sex of Subject X Case Type X LEVEL X Idea Set Analysis of Variance

Effect	d.f.	F	p
LEVEL	2,112	224.11	<.0001
Case Type	1,56	46.01	<.0001
Idea Set	3,168	8.09	<.0001
Case Type X LEVEL	2,112	15.38	<.0001
Beverage X Sex	1,56	4.93	<.031
Case Type X Idea Set	3,168	5.19	<.002
LEVEL X Idea Set	6,336	5.42	<.0001
Case Type X LEVEL X Idea Set	6,336	15.41	<.0001
Beverage X LEVEL X Idea Set	6,336	3.03	<.007
Sex X LEVEL X Idea Set	6,336	4.76	<.0001

Pairwise comparisons showed that the idea set main effect was due to a significantly lower mean rating (at the $p < .05$ level) for Idea Set D ($M = .10$; $SD = 3.38$) than for Idea Sets A ($M = .63$; $SD = 3.27$), B ($M = .99$, $SD = 3.15$), or C ($M = 1.03$; $SD = 3.39$); the means for the latter three sets did not differ significantly from each other.

Post hoc analyses on the significant Case Type X LEVEL X Idea Set interaction were performed separately for each of the levels of the idea set variable and showed that the Case Type X LEVEL interactions were significant for all four idea sets (Idea Set A, $F(2, 126) = 14.04$, $p < .0001$; Idea Set B, $F(2, 126) = 20.29$, $p < .0001$; Idea Set C, $F(2, 126) = 23.36$, $p < .0001$; Idea Set D, $F(2, 126) = 3.97$, $p < .022$).

Separate comparisons between OLDS and NEWS at each level of LEVEL for each idea set, however, showed that the pattern of significant differences varied among the four idea sets. For Idea Sets B and C, the OLDS were rated significantly higher than the NEWS for the ONES (Idea Set B, $F(1,63) = 40.06$, $p < .0001$; Idea Set C, $F(1,63) = 49.85$, $p < .0001$), but not for the TWOS (Idea Set B, $F(1,63) = 3.60$, $p = .06$; Idea Set C, $F(1,63) = 1.24$, $p = .27$) or the THREES (Idea Set B, $F(1,63) = 2.35$, $p = .13$; Idea Set C, $F(1,63) = 3.02$, $p = .09$). For Idea Set D, the OLDS were rated significantly higher than the NEWS for the ONES, $F(1,63) = 15.73$, $p < .0001$, and the TWOS, $F(1,63) = 35.60$, $p < .0001$, but not for the THREES, $F(1,63) = 2.70$, $p = .11$. For Idea Set A, the NEWS were rated significantly higher than the OLDS for the TWOS, $F(1,63) = 8.72$, $p < .005$, the OLDS were rated significantly higher than the NEWS for the THREES, $F(1,63) = 20.49$, $p < .0001$, and there was no significant difference for the ONES, $F(1,63) = .36$, $p = .55$ (see Table 14 for the relevant means). Overall, as presented in Table 14, the OLDS were rated significantly higher than the NEWS for Idea Sets B, $F(1, 319) = 9.80$, $p < .002$, C, $F(1, 319) = 10.36$, $p < .002$, and D, $F(1, 319) = 31.39$, $p < .0001$, but not for idea set A, $F(1, 319) = .34$, $p = .56$.

Separate one-way analyses of variance were conducted on the LEVEL variable for each of the four idea sets, but these analyses failed to reveal the source of the significant LEVEL X Idea Set interaction. Significant simple main effects for LEVEL were found for all idea sets (Idea Set A, $F(2, 318) = 76.77$, $p < .0001$; Idea Set B, $F(2, 318) = 58.66$, $p < .0001$; Idea Set C, $F(2, 318) = 77.75$, $p < .0001$; Idea Set D, $F(2, 318) = 54.72$, $p < .0001$), and as shown in Table 15 there was full integrative ordering (i.e., THREES > TWOS > ONES) for all idea sets

Table 14. Mean Certainty Ratings for OLDS and NEWS by LEVEL and Idea Set

	Idea Set A		Idea Set B		Idea Set C		Idea Set D	
LEVEL	OLDS	NEWS	OLDS	NEWS	OLDS	NEWS	OLDS	NEWS
ONES								
M	-1.49	-1.22	.71	-2.20	.99	-2.49	-1.03	-2.71
SD	3.34	2.73	3.46	2.19	3.81	2.28	3.11	2.37
Group[a]	A	A	A	B	A	B	A	B
TWOS								
M	.17	1.33	1.22	.44	.66	.18	1.91	-.62
SD	3.26	2.19	2.90	2.05	3.13	2.40	3.21	2.40
Group[a]	B	A	A	A	A	A	A	B
THREES								
M	3.49	1.53	2.52	3.25	3.07	3.73	1.96	1.07
SD	2.14	2.93	2.80	2.21	2.50	1.97	3.26	3.12
Group[a]	A	B	A	A	A	A	A	A
All Levels Combined								
M	.72	.55	1.48	.50	1.57	.50	.95	-.75
SD	3.60	2.91	3.15	3.09	3.35	3.36	3.47	3.06
Group[a]	A	A	A	B	A	B	A	B

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Table 15. Mean Certainty Ratings by Idea Set for OLDS and NEWS Combined

Idea Set	LEVEL THREES	 TWOS	 ONES
Idea Set A			
M	2.51	.75	-1.36
SD	2.74	2.82	3.04
Group[a]	A	B	C
Idea Set B			
M	2.88	.83	-.75
SD	2.54	2.53	3.23
Group[a]	A	B	C
Idea Set C			
M	3.40	.42	-.72
SD	2.27	2.79	3.57
Group[a]	A	B	C
Idea Set D			
M	1.51	.65	-1.87
SD	3.21	3.09	2.88
Group[a]	A	B	C

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

with the differences among all LEVEL means within each idea set being significant at the $p < .05$ level.

Post hoc analyses of variance on the Beverage X LEVEL X Idea Set interaction at each level of the beverage administration variable revealed that the LEVEL X Idea Set interaction was significant for given alcohol subjects, $F(6, 570) = 5.14$, $p < .0001$; but was not significant for given nonalcohol subjects, $F(6, 570) = .79$, $p = .58$. For the given alcohol subjects only, one-way analyses of variance found significant simple main effects for all idea sets (Idea Set A, $F(2, 158) = 44.97$, $p < .0001$; Idea Set B, $F(2, 158) = 29.22$, $p < .0001$; Idea Set C, $F(2, 158) = 39.73$, $p < .0001$; Idea Set D, $F(2, 158) = 30.52$, $p < .0001$). As shown in Table 16, pairwise comparisons revealed for the given alcohol subjects for Idea Sets A and B that the differences among all LEVEL means were significant at the $p < .05$ level, while for Idea Set C all differences were significant except between the ONES and the TWOS, and for Idea Set D all the differences were significant except between the TWOS and the THREES.

Separate post hoc analyses of variance on the significant Sex of Subject X LEVEL X Idea Set interaction for each sex revealed significant LEVEL X Idea Set interactions for both the males, $F(6, 570) = 2.60$, $p < .017$, and the females, $F(6, 570) = 4.61$, $p < .0001$. Further one-way analyses of variance at each level of the idea set variable for each sex found simple main effects for LEVEL for all idea sets for both males (Idea Set A, $F(2, 158) = 58.47$, $p < .0001$; Idea Set B, $F(2, 158) = 28.97$, $p < .0001$; Idea Set C, $F(2, 158) = 25.57$, $p < .0001$; Idea Set D, $F(2, 158) = 45.72$, $p < .0001$) and for females (Idea Set A, $F(2, 158) = 25.00$, $p < .0001$; Idea Set B, $F(2, 158) = 29.59$, $p < .0001$; Idea Set C, $F(2, 159) = 59.05$, $p < .0001$; Idea Set D, $F(2, 158) = 16.77$, $p < .0001$). For both sexes there was full integrative ordering (i.e., THREES > TWOS > ONES) for all idea sets. Pairwise comparisons showed significant

Table 16. Mean Certainty Ratings for Subjects Given Alcohol by Idea Sets for OLDS and NEWS Combined

	LEVEL		
Idea Set	THREES	TWOS	ONES
Idea Set A			
M	2.68	.96	-1.51
SD	2.92	2.86	2.98
Group[a]	A	B	C
Idea Set B			
M	3.19	1.38	-.52
SD	2.47	2.40	3.42
Group[a]	A	B	C
Idea Set C			
M	3.39	-.31	-.56
SD	2.42	2.59	3.55
Group[a]	A	B	C
Idea Set D			
M	1.50	1.09	-1.80
SD	3.30	3.11	2.93
Group[a]	A	A	B

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

differences among all LEVEL means at the $p < .05$ level for Idea Sets A, B, and D for the males, and for Idea Sets A, B, and C for the females; for Idea Set C the difference between the ONES and the TWOS was not significant for the males, while for Idea Set D, the difference between the TWOS and the THREES was not significant for the females (see Tables 17 and 18).

Table 17. Mean Certainty Ratings of Males by Idea Set for OLDS and NEWS Combined

	LEVEL		
Idea Set	THREES	TWOS	ONES
Idea Set A			
M	2.73	1.01	-1.81
SD	2.44	2.74	2.76
Group[a]	A	B	C
Idea Set B			
M	2.78	.55	-1.00
SD	2.55	2.83	3.32
Group[a]	A	B	C
Idea Set C			
M	2.98	.24	-.28
SD	2.28	2.85	3.74
Group[a]	A	B	C
Idea Set D			
M	2.11	.49	-2.13
SD	2.93	3.06	2.85
Group[a]	A	B	C

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Table 18. Mean Certainty Ratings of Females by Idea Set for OLDS and NEWS Combined

	LEVEL		
Idea Set	THREES	TWOS	ONES
Idea Set A			
M	2.29	.49	-.90
SD	3.01	2.91	3.25
Group[a]	A	B	C
Idea Set B			
M	2.99	1.11	-.49
SD	2.55	2.17	3.16
Group[a]	A	B	C
Idea Set C			
M	3.82	.60	-1.16
SD	2.19	2.74	3.35
Group[a]	A	B	C
Idea Set D			
M	.92	.81	-1.61
SD	3.38	3.15	2.91
Group[a]	A	A	B

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

Analysis of NONCASE Scores

Using a 2 X 2 X 2 X 5 (Beverage X Instruction X Sex of Subject X LEVEL--the five levels were the four levels of NEW CASES and NONCASES) analysis of variance, the mean certainty rating of the NONCASES was compared with the composite mean scores for the NEWS. A significant main effect for LEVEL was found, $F(4, 224) = 466.76$, $p < .0001$. Pairwise comparisons revealed significant differences at the $p < .05$ level among all LEVEL means with NONCASES receiving the lowest mean rating (see Table 19 and Figure 6).

Table 19. Mean Certainty Ratings for NONCASES and NEWS

	LEVEL				
	FOURS	THREES	TWOS	ONES	NONCASES
M	3.23	2.39	.31	-2.14	-4.73
SD	1.44	1.30	1.60	1.82	.62
Group[a]	A	B	C	D	E

[a] Groups with different letters were significantly different from each other at the $p < .05$ level.

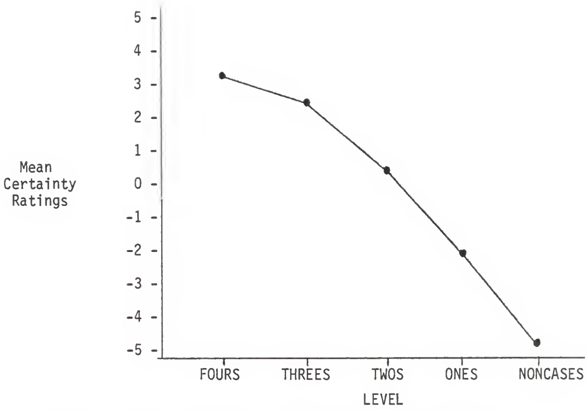

Figure 6. Mean certainty ratings for NONCASES and NEWS.

CHAPTER FOUR
DISCUSSION

The major hypothesis of the study, that alcohol consumption would disrupt the ability of subjects to perform cognitive integration on the Bransford and Franks' (1971) task, was not supported. Instead, as reflected in the significant LEVEL main effect obtained in the composite score analysis of the NEW CASES, the cognitive integration effect was replicated for all treatment groups included in the experiment, regardless of beverage administration or beverage content instructions. Moreover, the presence of significant differences among all LEVEL means in the composite score analysis suggests that the integration effect was quite powerful. All treatment groups also showed some specific sentence memory and correctly rejected the NONCASE sentences with a high degree of certainty. Additionally, both the social stimulus type and the idea set variables interacted significantly with the integration and specific sentence memory effects. Subjects showed greater integrative and specific sentence memory effects for the social than for the nonsocial sentences. Also, both integrative and specific sentence memory effects were strongest for Idea Set D, intermediate for Idea Sets B and C, and weakest for Idea Set A.

Overall, the results of this experiment contrast with previous research that has consistently found alcohol-induced deficits in memory functions (Schonhaut, Note 1). This earlier research includes deficits found in free recall clustering (Birnbaum et al., 1978, Experiment 1; Parker et al., 1974, Rosen & Lee, 1976) which, like cognitive integration, presumably requires organizational encoding. Although it is not readily apparent why alcohol-induced deficits were not found in this study, it is possible that the integration effect found with the Bransford and Franks (1971) task involves memory processes that are qualitatively different from those involved in free recall clustering; if so, these processes, unlike those involved in a free recall task, may not be disrupted by the moderate alcohol doses administered in the present study. Two important qualitative differences between integration and free recall tasks support further investigation of this possibility. First, the stimulus materials used in the cognitive integration task, unlike those employed in a free recall task, are presented within a semantically meaningful context. Second, the integration task, in contrast to a free recall task, does not require rote (e.g., episodic) memory, but instead involves abstracting semantic memory structures. To address the role of these possible qualitative differences in future research on alcohol's effects on memory, tasks that include memory for paragraphs (e.g., Bransford, 1979) and nonverbal integration (e.g., Franks & Bransford, 1971) might be considered.

A recent study by Tucker et al. (Note 2) provides some additional data relevant to understanding the effects of alcohol consumption on recall of semantically meaningful information. Using a balanced placebo design, subjects in this study were administered an alcoholic or nonalcoholic beverage and then performed two separate recall tasks involving audiotaped conversations between two persons. Only minimal evidence of alcohol-induced deficits were found; i.e., the results showed no significant alcohol-induced deficits on one of the tasks, while only given alcohol/told nonalcohol subjects showed significant deficits on the other task. These results along with those from the current study provide some limited support for the speculation that alcohol consumption produces less disruption in memory for semantically meaningful information than for semantically irrelevant information, perhaps because of subjects greater experience with the former stimuli in both sober and intoxicated states. Clearly, however, more research using both types of stimuli is needed before any firm conclusions may be drawn.

A second finding of this experiment was that in addition to exhibiting integrative memory, all subjects showed some specific sentence memory. The mean certainty rating of the OLDS was generally higher than for the NEWS, and the Case Type X LEVEL interaction that was obtained indicated that significant specific sentence memory effects occurred for the ONES and the TWOS, although not for the THREES. The data further showed that the degree of specific sentence memory effects was significantly greater for the ONES than for the TWOS. Thus, the present results are generally consistent with those of Bransford and Franks (1971, Experiment 3), who found that the difference between the OLDS and the NEWS was significant only for the ONES, and also with those of Franks and Bransford (1972), who found that the difference between the OLDS and NEWS was significant only for the ONES and approached significance for the TWOS.

The present results also tentatively support the possibility that both integrative and specific sentence memory may be stronger for social than for nonsocial idea sets. Relevant to the integrative memory effects was the finding that for the NEWS, the differences among all LEVEL means were significant for the social idea sets (i.e., there were four significantly separated levels), whereas the differences among LEVEL means were not all significant for the nonsocial idea sets (i.e., there were three of 4 significantly separated levels). Furthermore, the mean difference between the OLDS and the NEWS was significantly greater for the social than for the nonsocial idea sets. A significant LEVEL X Social Stimulus Type interaction also revealed that for the social idea sets, the OLDS were rated significantly higher than the NEWS for both the ONES and the TWOS, while for the nonsocial idea sets, the OLDS were rated significantly higher than the NEWS only for the ONES. Additional evidence that specific sentence memory effects may be relatively more robust for the social idea sets was suggested by a significant Beverage X Case Type X Social Stimulus Type interaction, which showed that for the social idea sets, both the given alcohol and given nonalcohol subjects rated the OLDS significantly higher than the NEWS; in contrast, for the nonsocial idea sets, only the given alcohol subjects rated the OLDS significantly higher than the NEWS. One possible explanation of these findings is that the social stimuli may be remembered better than the nonsocial stimuli because they are more meaningful and familiar to subjects. However, the current findings must be considered tentative because they are based on only two social and two nonsocial idea sets, and further research using other social and nonsocial idea sets seems indicated.

This study provides some data relevant to the selection of specific idea sets in such future research. In the present study, both integrative and specific sentence memory were best for Idea Set D (social), intermediate for Idea Sets B (nonsocial) and C (social), and worst for Idea Set A (nonsocial). Evidence of the relative strength of the integration effect with the different idea sets is the significant LEVEL X Idea Set interaction for the NEWS that revealed four significantly separated levels for Idea Set D, three significantly separated levels for Idea Sets B and C, and two significantly separated levels for Idea Set A. Several findings are relevent to the strength of the specific sentence memory effects for the different idea sets. First, for Idea Sets B, C, and D, the mean rating for the OLDS was significantly higher than for the NEWS, while for Idea Set A the difference was not significant. Second, for Idea Set D, the OLDS were rated significantly higher than the NEWS for both the ONES and the TWOS, while for Idea Sets B and C, the OLDS were rated significantly higher than the NEWS only for the ONES; for Idea Set A, the NEWS were actually rated significantly higher than the OLDS for the TWOS, while the OLDS were rated significantly higher than the NEWS for the THREES. Based on these data, future research use of Idea Set D can be strongly recommended and use of Idea Sets B and C moderately recommended. It may be advisable, however, to avoid using Idea Set A, which is one of Bransford and Franks' (1971) original idea sets.

It is noteworthy that the ordering of idea sets from strongest to weakest was the same for both the integrative and specific sentence memory effects. In the past, it has been suggested that these two effects should be inversely related to one another (Bransford & Franks, 1971; Griggs & Keen, 1977; Reitman & Bower, 1973). For instance Griggs and Keen wrote, "subjects should be better on recognition of particular information prior to prototype completion that after" (p. 688). Bransford and Franks (1971) suggested that the minimal specific sentence memory effects found in their study were evidence that memory is essentially the product of a constructive (i.e., integrative) process. While the integration effect found by Bransford and Franks was replicated in this experiment, the present data also insinuate that integrative and specific sentence memory effects may be positively related to each other--in other words, that information which is integrated most fully also shows the greatest specific sentence memory effects. Based on the present post hoc data analyses, this is only a speculation, but seems to beckon further investigation.

Significant results that did not involve LEVEL (i.e., integration) effects for the NEWS or case type (i.e., specific sentence memory) effects for the OLDS + NEWS are of little theoretical interest. Specifically, the LEVEL effects found with the OLDS + NEWS that did not involve an interaction with case type (i.e., LEVEL, LEVEL X Idea Set, Sex of Subject X LEVEL X Idea Set, Beverage X LEVEL X Idea Set effects) cannot be readily interpreted since integration effects were confounded with specific sentence memory effects and no FOURS were included in these data. The significant idea set main effects found with both the NEWS and the OLDS + NEWS showed that the mean certainty ratings for Idea Set D were significantly lower than for the other three idea sets, but the meaning of this is not evident. Likewise, the Beverage X Sex of Subject interaction for the OLDS + NEWS that showed that given nonalcohol males had significantly lower mean certainty ratings than given alcohol males is a finding that is difficult to interpret.

One general qualification of the present findings concerns the moderate alcohol doses administered in this study. The estimated mean peak BAL was approximately .07%, which is well below most legal limits of intoxication (i.e., .10%). Since many people drink past the point of legal intoxication, it is relevant to inquire whether higher doses may produce the hypothesized disruption in cognitive integration. If higher alcohol doses are used in future research, however, an important consideration is whether a balanced placebo design should be used. Even at the dose level used in the present study, the instructional manipulation was not fully effective, and at larger doses this problem would likely to exacerbated. Therefore, as suggested by Tucker and Vuchinich (1983), in studies involving higher doses it may be advisable to use a three group design that omits the given alcohol/told nonalcohol deception group from the balanced placebo design. While this would preclude a complete assessment of the influence of nonpharmacological variables on postconsumption behaviors, at higher doses such effects may play a diminishing role in determining individual's behavior and thus be of less experimental importance.

In summary, this experiment found no evidence of alcohol-induced deficits in integrative memory at the moderate dose level employed. This finding contrasts with the results of previous research that found alcohol-induced memory impairment on many different tasks. A major difference between the present study and most previous research, however, is that the current experiment used semantically meaningful stimulus materials. Further research on the effects of alcohol consumption on memory for semantically meaningful information seems warranted.

APPENDIX A
IDEA SETS

Idea Set A (Nonsocial)

FOUR: The ants in the kitchen ate the sweet jelly which was on the table.

THREES: The ants ate the sweet jelly which was on the table.

The ants in the kitchen ate the jelly which was on the table.

The ants in the kitchen ate the sweet jelly.

TWOS: The ants in the kitchen ate the jelly.

The ants ate the sweet jelly.

The sweet jelly was on the table.

The ants ate the jelly which was on the table.

ONES: The ants were in the kitchen.

The ants ate the jelly.

The jelly was sweet

The jelly was on the table.

Idea Set B (Nonsocial)

FOUR: The rock which rolled down the mountain crushed the tiny hut at the edge of the woods.

THREES: The rock crushed the tiny hut at the edge of the woods.

The rock which rolled down the mountain crushed the hut at the edge of the woods.

The rock which rolled down the mountain crushed the tiny hut.

TWOS: The rock which rolled down the mountain crushed the hut.

The rock crushed the tiny hut.

The tiny hut was at the edge of the woods.

The rock crushed the hut at the edge of the woods.

ONES: The rock rolled down the mountain.

The rock crushed the hut.

The hut was tiny.

The hut was at the edge of the woods.

Idea Set C (Social)

FOUR: The tall musician danced with the blue-eyed woman who lived by the beach.

THREES: The musician danced with the blue-eyed woman who lived by the beach.

The tall musician danced with the woman who lived by the beach.

The tall musician danced with the blue-eyed woman.

TWOS: The tall musician danced with the woman.

The musician danced with the blue-eyed woman.

The blue-eyed woman lived by the beach.

The musician danced with the woman who lived by the beach.

ONES: The musician was tall.

The musician danced with the woman.

The woman had blue-eyes.

The woman lived by the beach.

Idea Set D (Social)

FOUR: The young nurse watched the carefree student who smoked a cigarette.

THREES: The young nurse watched the student who smoked a cigarette.

The nurse watched the carefree student who smoked a cigarette.

The young nurse watched the carefree student.

TWOS: The young nurse watched the student.

The nurse watched the carefree student.

The carefree student smoked a cigarette.

The nurse watched the student who smoked a cigarette.

ONES: The nurse was young.

The nurse watched the student.

The student was carefree.

The student smoked a cigarette.

APPENDIX B
NONCASE SENTENCES

1. The young student watched the carefree nurse who smoked a cigarette.
2. The tall woman danced with the blue-eyed musician who lived by the beach.
3. The rock which rolled down the mountain crushed the carefree student who smoked a cigarette.
4. The tall musician ate the sweet jelly which was on the table.

APPENDIX C
CONSENT FOR RESEARCH STUDY

Subject's Name____

Project Title: Effects of Alcohol on Memory for Sentences
Protocol Number: 307-82
Investigators: Steven Schonhaut, M.A., Department of Clinical Psychology
Jalie Tucker, Ph.D., Assistant Professor of Clinical Psychology, Department of Psychiatry
Rudy Vuchinich, Ph.D., Assistant Professor, Department of Clinical Psychology

(You must be at least 19 years of age to participate in this research.)

The purpose of this 1.5-hour study is to investigate how moderate alcohol consumption may influence memory for sentences. After completing some initial questionnaires about your drinking habits, you will be administered either an alcoholic beverage or a nonalcoholic control beverage. After allowing time for alcohol absorption, you will be given a sentence memory task.

I understand that my blood alcohol level will be assessed by the administration of 2 breath tests--one prior to consuming any beverage to ensure that I have not been drinking prior to the study and another following the experimental procedures. The study will end after a final questionnaire that asks about my reactions to the study; at this time, the purpose of all experimental procedures will be fully explained to me and any questions I have concerning the study will be answered to my satisfaction.

For some persons, there is a slight possibility that consumption of alcoholic beverages will result in negative physical effects, such as headache, nausea, or vomiting. Therefore, before you are allowed to participate we must be assured that you have no history of alcoholism, diabetes, heart disease, epilepsy, or any other physical or psychological condition that would preclude your consuming alcohol. You must not participate if you are presently taking any medication that might have adverse effects if it were to be combined with alcohol (e.g., valium, librium, phenobarbitol). I understand that pregnant women are, without exception, excluded from participating in this study. If any of these restrictions apply, please inform the experimenter.

If you choose to participate, you must agree not to drive a motor vehicle or operate other machinery for at least 4 hours after completion of each session of the experiment. You must agree to remain in the laboratory until your blood alcohol level is below .05% or allow us to accompany you home if you must leave. You must verify that you are at least 19 years of age.

If you agree to participate, you will be assigned a number. This number, instead of your name, will be used to identify your data. Thus, any information about you that we gather during this investigation will be confidential to the extent provided by law. Only the investigators listed above and their research assistants will have access to the data.

Benefits to be expected from this study are 2 hours of research credit and whatever information or satisfaction you may gain from participating in an investigation of human drinking behavior. You will not be paid for your participation. Scientific benefits to be expected are increased knowledge of the effects of alcohol on human memory.

Even if you agree to participate at this time, you are free to withdraw from this study at any time in the future without prejudice. If you have any questions about any aspect of this study, please ask them at this time.

In the event of my sustaining a physical injury which is proximately caused by this experiment, no professional medical care will be provided me without charge.

I understand that if I am physically injured during this experiment, and if the experimenter is at fault, that I may seek appropriate compensation and may contact the Insurance Coordinator for information about compensation at 107 Tigert Hall, University of Florida. Telephone number 392-1325. I understand that no other form of compensation is available.

****

I have fully explained to ___________________________ (subject) the nature and purpose of the above described procedure and the risks that are involved in its performance. I have answered and will answer all questions to the best of my ability.

____

Name and Signature of Person Obtaining Consent

****

I have been fully informed of the above-described procedure with its possible benefits and risks and have received a copy of this descriptor. I understand that I am free to withdraw this consent and discontinue participation in this project at any time without prejudice.

____ _______________

Subject's Signature Date

****

This document cannot contain any exculpatory language through which the subject is made to waive or to appear to waive any of his or her legal rights, including any release of the institution or its agents from liability for negligence.

____ _______________

Principal Investigator Date

APPENDIX D
ACQUISITION STIMULI

Practice Sentences	Elliptical Questions
A. The large window was on the porch.	Where?
B. The scared cat was running from the barking dog.	What ran?
Acquisition Sentences	
1. The tall musician danced with the woman.	Did what?
2. The ants ate the sweet jelly which was on the table.	Where?
3. The rock crushed the hut?	Did what?
4. The nurse watched the carefree student.	Did what?
5. The rock crushed the hut at the edge of the woods.	Where?
6. The ants were in the kitchen.	Where?
7. The nurse watched the carefree student who smoked a cigarette.	Watched what?
8. The musician danced with the blue-eyed woman.	With whom?
9. The rock crushed the tiny hut at the edge of the woods.	What did?
10. The nurse was young.	Was what?
11. The musician danced with the blue-eyed woman who lived by the beach.	Who danced?
12. The jelly was on the table.	What was?
13. The tall musician danced with the woman who lived by the beach.	Did what?

14. The ants in the kitchen ate the jelly.	Where?
15. The nurse watched the student.	Did what?
16. The rock crushed the tiny hut.	Did what?
17. The ants in the kitchen ate the jelly which was on the table.	Did what?
18. The young nurse watched the student who smoked a cigarette.	Who watched?
19. The woman lived by the beach.	Lived where?
20. The rock rolled down the mountain.	Did what?
21. The nurse watched the student who smoked a cigarette.	Smoked what?
22. The musician was tall.	Was what?
23. The rock which rolled down the mountain crushed the hut at the edge of the woods.	Crushed what?
24. The ants ate the sweet jelly.	Ate what?

APPENDIX E
RECOGNITION ANSWER SHEET

Please indicate whether you think each sentence is identical to one of the sentences presented before the rest break. Circle YES if you think a sentence is identical and NO if you think a sentence is not identical to one of those presented earlier. Also, indicate how much confidence you have in each answer on a 1 to 5 scale where 1 = "very low confidence" and 5 = "very high confidence."

1. YES NO _____
2. YES NO _____
3. YES NO _____
4. YES NO _____
5. YES NO _____
6. YES NO _____
7. YES NO _____
8. YES NO _____
9. YES NO _____
10. YES NO _____
11. YES NO _____
12. YES NO _____
13. YES NO _____
14. YES NO _____
15. YES NO _____
16. YES NO _____
17. YES NO _____
18. YES NO _____
19. YES NO _____
20. YES NO _____
21. YES NO _____
22. YES NO _____
23. YES NO _____
24. YES NO _____
25. YES NO _____
26. YES NO _____
27. YES NO _____
28. YES NO _____
29. YES NO _____
30. YES NO _____
31. YES NO _____
32. YES NO _____
33. YES NO _____
34. YES NO _____
35. YES NO _____
36. YES NO _____
37. YES NO _____
38. YES NO _____
39. YES NO _____
40. YES NO _____

41. YES NO _____
42. YES NO _____
43. YES NO _____
44. YES NO _____
45. YES NO _____
46. YES NO _____
47. YES NO _____
48. YES NO _____
49. YES NO _____
50. YES NO _____
51. YES NO _____
52. YES NO _____
53. YES NO _____
54. YES NO _____
55. YES NO _____
56. YES NO _____
57. YES NO _____
58. YES NO _____
59. YES NO _____
60. YES NO _____
61. YES NO _____
62. YES NO _____
63. YES NO _____
64. YES NO _____
65. YES NO _____
66. YES NO _____
67. YES NO _____
68. YES NO _____
69. YES NO _____
70. YES NO _____
71. YES NO _____
72. YES NO _____
73. YES NO _____
74. YES NO _____
75. YES NO _____
76. YES NO _____
77. YES NO _____
78. YES NO _____
79. YES NO _____
80. YES NO _____

APPENDIX F
RECOGNITION SENTENCES

1. The hut was at the edge of the woods.

2. The musician danced with the woman who lived by the beach.

3. The carefree student smoked a cigarette.

4. The hut was tiny.

5. The ants ate the sweet jelly which was on the table.

6. The tall woman danced with the blue-eyed musician who lived by the beach.

7. The nurse watched the student who smoked a cigarette.

8. The ants in the kitchen ate the sweet jelly which was on the table.

9. The musician was tall.

10. The young nurse watched the carefree student.

11. The rock which rolled down the mountain crushed the hut.

12. The sweet jelly was on the table.

13. The tall musician danced with the blue-eyed woman who lived by the beach.

14. The rock which rolled down the mountain crushed the hut at the edge of the woods.

15. The ants in the kitchen ate the jelly.

16. The young student watched the carefree nurse who smoked a cigarette.

17. The tall musician danced with the blue-eyed woman.

18. The nurse watched the student.

19. The jelly was sweet.

20. The student smoked a cigarette.

21. The musician danced with the blye-eyed woman who lived by the beach.

22. The ants ate the jelly which was on the table.

23. The tiny hut was at the edge of the woods.

24. The tall musician ate the sweet jelly which was on the table.

25. The rock which rolled down the mountain crushed the tiny hut.

26. The student was carefree.

27. The rock crushed the hut at the edge of the woods.

28. The woman had blue-eyes.

29. The ants were in the kitchen.

30. The young nurse watched the carefree student who smoked a cigarette.

31. The musician danced with the woman.

32. The ants in the kitchen ate the sweet jelly.

33. The young nurse watched the student who smoked a cigarette.

34. The rock crushed the hut.

35. The tall musician danced with the woman.

36. The young nurse watched the student.

37. The rock which rolled down the mountain crushed the tiny hut at the edge of the woods.

38. The blue-eyed woman lived by the beach.

39. The rock which rolled down the mountain crushed the carefree student who smoked a cigarette.

40. The ants ate the jelly.

APPENDIX G
POSTEXPERIMENTAL QUESTIONNAIRE

Research Questionnaire

1. Which beverage did you receive? Check one:____Alcohol____Nonalcohol

2. If you received alcohol, how many ounces of alcohol do you think you drank:

_______I didn't receive alcohol
_______1 oz. alcohol
_______2 oz.
_______3 oz.
_______4 oz.
_______5 oz.
_______6 oz. of alcohol
_______7 oz.
_______8 oz.
_______9 oz.
_______10 oz.

3. How intoxicated do you feel now? Make a rating using an 11-point scale, with 0 = "not intoxicated at all" and 10 = "very intoxicated":____________________

APPENDIX H
DEBRIEFING STATEMENT

I understand that I was not fully informed initially about the beverage administration procedures used in this experiment. I understand that half of the subjects in this study were either told that they were receiving an alcoholic beverage and then actually received a nonalcoholic beverage or were told that they were receiving a nonalcoholic beverage and subsequently received an alcoholic beverage to consume. I have been fully informed of my actual beverage consumption in this experiment. The reasons for this experimental manipulation and all other experimental procedures have been fully explained to me (to control for the expectancies commonly associated with alcohol use). I understand that I (DID / DID NOT) (circle one) consume a moderate dose of alcohol.

We are very sorry that we could not fully inform you of this aspect of the study until now. If we had done so earlier, however, we may have influenced your behavior and would not have been able to assess adequately the effects of these variables.

If you have any questions or want to talk about any part of the experiment, please feel free to do so.

Your participation is deeply appreciated. We would like to request that you not discuss the entire purpose of this study with anyone until its completion at the end of the semester, since this may bias the behavior of future participants.

I understand that deceptive research methods such as the ones employed in this study are not generally acceptable and only permitted when no other option is available to the researcher to adequately test his hypotheses. The necessity for the deceptions employed in this investigation has been fully explained to me.

I have agreed upon being debriefed to allow the data obtained from me to be used by the investigator in this experiment.

****

I have read the above statement and have discussed any questions or feelings I may have had about the experiment.

___________________________ ____
Date Signature

My Blood Alcohol Concentration is ____________%.

APPENDIX I
SUMMARY OF PRETEST DATA

As can be seen from Table 20 the data for the total composite, the nonsocial composite, the social composite, and for individual Idea Sets B and D show full integrative ordering for the NEW CASES (i.e., FOURS > THREES > TWOS > ONES). For Idea Sets A and C, it may be seen that the full integrative pattern was not found. However, since the pattern of the composite data replicated the Bransford and Franks' (1971) integration effect and since the idea set with the most deviant results was one of those that had been used successfully in past research (Idea Set A), it was decided to proceed with the main study using the same four idea sets as in the pretest.

Table 20. Pretest Mean Certainty Ratings for the NEW CASES

	LEVEL			
Idea Sets	FOURS	THREES	TWOS	ONES
Total Composite	3.22	2.40	.60	-1.14
Nonsocial Composite	2.77	1.86	1.25	-.68
Social Composite	3.66	2.93	-.06	-1.59
Idea Set A	1.59	2.64	2.23	-.23
Idea Set B	3.95	1.05	.27	-1.14
Idea Set C	3.09	4.00	.16	-1.66
Idea Set D	4.23	1.86	-.27	-1.52

REFERENCE NOTES

1. Schonhaut, S. J. The effects of acute alcohol intoxication on memory from an information processing point of view. Unpublished manuscript. University of Florida, 1982.

2. Tucker, J., Vuchinich, R., & Schonhaut, S. The effects of alcohol on the recall of social information. Paper submitted for review to the *Journal of Personality and Social Psychology*.

REFERENCES

Anderson, J., & Bower, G. Human Associative Memory. Washington, D.C.: Winston and Sons, 1973.

Birnbaum, I. M., Johnson, M. K., Hartley, J. T., & Taylor, T. H. Alcohol and elaborative schemas for sentences. Journal of Experimental Psychology: Human Learning and Memory, 1980, 6, 293-300.

Birnbaum, I. M., Parker, E. S., Hartley, J. T., & Noble, E. S. Alcohol and memory: Retrieval processes. Journal of Verbal Learning and Verbal Behavior, 1978, 17, 325-335.

Bransford, J. D. Human Cognition: Learning, Understanding, and Remembering. Belmont, California: Wadsworth, 1979.

Bransford, J. D., & Franks, J. J. The abstraction of linguistic ideas. Cognitive Psychology, 1971, 2, 331-350.

Cahalan, D., Cisin, I., & Crossley, H. American Drinking Practices: A National Study of Drinking Behavior and Attitudes (monograph no. 6). New Brunswick, NJ: Rutgers Center of Alcohol Studies, 1969.

Conners, G. J., & Maisto, S. A. Effects of alcohol, instructions, and consumption rate on motor performance. Journal of Studies on Alcohol, 1980, 41, 509-517.

Flagg, R. W., & Reynolds, A. G. Modality of presentation and blocking in sentence recognition memory. Memory and Cognition, 1977, 5, 111-115.

Franks, J. J., & Bransford, J. D. The abstraction of visual patterns. Journal of Experimental Psychology, 1971, 90, 65-74.

Franks, J. J., & Bransford, J. D. The acquisition of abstract ideas. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 311-315.

Goodwin, D. W., Powell, B., Bremer, D., Hoine, H., & Stern, J. Alcohol and recall: State-dependent effects in man. Science, 1969, 103, 1358-1360.

Griggs, R. A., & Keen, D. M. The role of test procedure in linguistic integration studies. Memory and Cognition, 1977, 5, 685-689.

Hull, J. G. A self-awareness model of the causes and effects of alcohol consumption. Journal of Abnormal Psychology, 1981, 90, 586-600.

Jones, B. M. Memory impairment on the ascending and descending limbs of the blood alcohol curve. Journal of Abnormal Psychology, 1973, 82, 24-32.

Jones, B. M., & Jones, M. K. Alcohol effects on women during the menstrual cycle. New York Academy of Sciences, 1976, 273. 576-587.

Knight, R. A., & Sims-Knight, J. E. Integration of linguistic ideas in schizophrenics. Journal of Abnormal Psychology, 1979, 88, 191-202.

Koh, S. D., Kayton, L., & Berry, R. Mnemonic organization in young nonpsychotic schizophrenics. Journal of Abnormal Psychology, 1974, 83, 14-22.

Lansky, D., & Wilson, G. T. Alcohol, expectations, and sexual arousal in males: An information processing analysis. Journal of Abnormal Psychology, 1981, 90, 35-45.

Marlatt, G. A., Demming, B., & Reid, J. B. Loss of control drinking in alcoholics: An experimental analogue. Journal of Abnormal Psychology, 1973, 81, 233-241.

Marlatt, G., & Rohsenow, D. Cognitive processes in alcohol use: Expectancy and the balanced placebo design. In N. Mello (Ed.), Advances in Substance Abuse: Behavioral and Biological Research. Greenwich, CT: JAI Press, 1980.

Miller, M. E., Adesso, V. J., Fleming, J. P., Gino, A., & Lauerman, R. Effects of alcohol on the storage and retrieval processes of heavy social drinkers. Journal of Experimental Psychology: Human Learning and Memory, 1978, 4, 246-255.

Parker, E. S., Alkana, R. L., Birnbaum, I. M., Hartley, J. T., & Noble, E. P. Alcohol and the disruption of cognitive processes. Archives of General Psychiatry, 1974, 31, 824-828.

Parker, E. S., Birnbaum, I. M., & Noble, E. P. Alcohol and memory: Storage and state-dependency. Journal of Verbal Learning and Verbal Behavior, 1976, 15, 691-702.

Peterson, R. C. Retrieval failures in alcohol state-dependent learning. Psychopharmacology, 1977, 38, 1224-1232.

Pokorny, A., Miller, B., & Kaplan, H. The brief MAST: A shortened version of the Mighigan Alcoholism Screen Test. American Journal of Psychiatry, 1972, 129, 342-345.

Reitman, J. S., & Bower, G. H. Storage and later recognition of exemplars of concepts. _Cognitive Psychology_, 1973, _4_, 194-206.

Rosen, L. J., & Lee, C. L. Acute and chronic effects of alcohol use on organizational processes in memory. _Journal of Abnormal Psychology_, 1976, 85, 309-317.

Tarter, R. E. Dissociate effects of ethyl alcohol. _Psychonomic Science_, 1970, _20_, 342-343.

Traupmann, K. L. Effects of categorization and imagery on recognition and recall by process and reactive schizophrenics. _Journal of Abnormal Psychology_, 1975, _84_, 307-314.

Tucker, J., & Vuchinich, R. An information processing analysis of the effects of alcohol on perceptions of facial emotions. _Psychopharmacology_, 1983, _79_, 215-219.

Vuchinich, R., & Sobell, M. Empirical separation of physiological and expected effects of alcohol on complex perceptual motor performance. _Psychopharmacology_, 1978, _60_, 81-85.

Wickelgren, W. A. Alcohol intoxication and memory storage dynamics. _Memory and Cognition_, 1975, _3_, 385-389.

Williams, R. M., Goldman, M. S., & Williams, D. L. Expectancy and pharmacological effects of alcohol on human cognitive and motor performance: The compensation effect. _Journal of Abnormal Psychology_, 1981, _90_, 267-270.

BIOGRAPHICAL SKETCH

Steven Jeffrey Schonhaut was born on May 16, 1952, in New York City. He graduated from Stuyvesant High School in 1970, and then attended the University of Rochester where he received a Bachelor of Arts degree in 1974. In 1978 he was awarded a U.S. Public Health Traineeship to study clinical psychology at the University of Florida, and he received a Master of Arts degree therefrom in 1981.

While attending the University of Florida, Steven developed a special interest in alcohol abuse following experiences in the Problem Drinkers Program at the J. Hillis Miller Health Center and as a research assistant to Drs. Jalie Tucker and Rudy Vuchinich. He will continue to pursue these interests as an intern at the Palo Alto Veterans Administration Medical Center.

Aside from his interests in psychology, Steven is an avid chess player and is currently a rated expert. He also enjoys a variety of cultural activities including art, theatre, and film. Additionally, he likes to attend sporting events and actively participates in tennis, jogging, and water sports.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Jalie A. Tucker, Chairman
Assistant Professor of Clinical Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Hugh C. Davis
Professor of Clinical Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Rudy E. Vuchinich

Rudy E. Vuchinich
Assistant Professor of Clinical Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Richard A. Griggs

Richard A. Griggs
Associate Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Randolph L. Carter

Randolph L. Carter
Associate Professor of Statistics

This dissertation was submitted to the Graduate Faculty of the College of Health Related Professions and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1984

Richard R. Gutekunst
Dean, College of Health Related Professions

Dean for Graduate Studies and Research